This is your Brain

TRADOC Heat Injury Prevention

NOTE: See TR 350-29,"PREVENTION OF HEAT AND COLD CASUALTIES" for complete details.

This is your brain when overheated.

Workload + Hot Weather

Feb '05

Causes of Heat Injuries

- Heat load increases greatly during work or exercise. Twenty times more energy is produced at maximal activity; 75 percent of that energy is converted to heat.

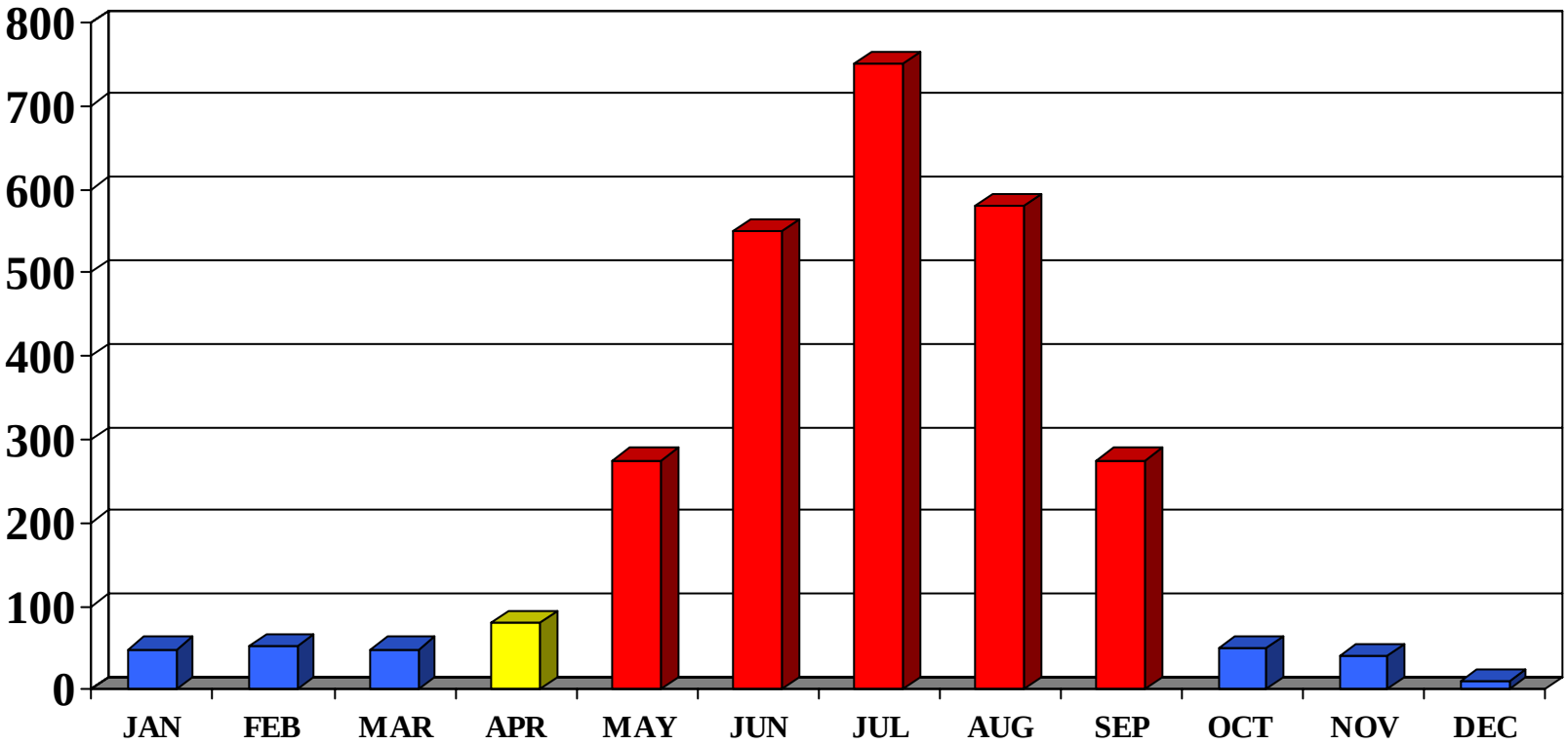
- The body is an 8 qt evaporative radiator that gets easily overloaded by:
  - exercise /work
  - hot/humid weather
  - too little water
  - too few electrolytes (salts or minerals)
    - this can be caused by too much water

- Heat injuries can cripple or kill you by "cooking" your internal organs

- You cannot train your organs to tolerate getting cooked. The damage is permanent; it cannot be undone. Cooked organs cannot be overcome by willpower or motivation.

- The <u>only</u> solution is <u>prevention of heat injuries!</u>

Highest Risk Months for Heat Injury



- Risk starts at 75 degrees Fahrenheit
- Most heat injuries occur between April and September
- First 3 weeks of BCT/OSUT are highest risk period (acclimatization incomplete)
- 15k march after FTX potentially very high risk.

Data Source: Army Medical Surveillance Activity (AMSA) from Defense Medical Surveillance System (vol. 07/No. 03).

Number of Heat Injuries Compared to Years of Service

Soldiers in their first 18-24 months of active duty have significantly higher rates of heat injuries.

Data Source: Army Medical Surveillance Activity (AMSA) from Defense Medical Surveillance System (vol. 07/No. 03).

Risk Factors for Heat Injury

- Sickle Cell Trait – 40x higher risk for Heat Injury
- Non-acclimatized
- Poor physical fitness status
- Overweight (fats act like a blanket)
- Illness (like upper respiratory infections, etc.)
- Drugs (interfere with body processes) (e.g. Sudafed)
- Nutritional supplements (ephedra, creatine, etc.)
- Donating blood (losing Red Blood Cells hurts heat adaptation)
- Alcohol (alcohol dehydrates)
- Prior heat injury
- Skin damage (sunburn, rash, poison ivy)
- "Work harder, not smarter" attitude – "overly motivated"

Risk Reducing Measures to Prevent Heat Injuries

- Monitor WBGT hourly in the area of the training (not at one or two central areas).
- Ensure water availability and accessibility.
- Use Ogden Cords (knotted cord on lapel):
  - Color-code Soldiers "at-risk" on cord
  - Monitor daily hydration (1 knot per canteen)
- Make changes as METT-T/Heat Category changes or when Heat casualties occur:
  - Events (distance, pace, breaks, etc.)
  - Uniform/equipment
  - Change "Heat Load"
  - Training schedule (time of day)
  - Work-rest cycle, etc.
- Power down: allow the CDR or Sr NCO on the ground make risk reducing decisions

Leader Heat Injury Prevention Actions

- <u>Spot check troops by</u>:
  - Confirming Buddy System is in place
  - Monitoring food intake (food/snack every 4 hrs or less)
  - Check Ogden cords for hydration status
  - Ask questions that require lucid thought processes (What day is it? Who is your DS? Where are you?)
- <u>Spot check cadre</u>
  - "What is current Heat Category?"
  - "Who is at risk?" "Who is their buddy?"
  - "What actions would you take if … "
- <u>Spot check medical support</u>
  - Check equipment, personnel, evacuation vehicle, immediate cooling ability
  - If no organic medical support, check for coordination of alternatives

OGDEN Cord

Heat Injury Hazards are Cumulative

- Leaders should assess the possibility of cumulative Heat Injury

- H- Heat category past 3 days
- E- Exertion level past 3 days
- A- Acclimatization/ individual risk factors
- T- Temperature/rest overnight

- Cluster of heat injuries on prior 3 days = HIGH RISK

H.E.A.T. IMT Heat Injury Risk Management Matrix (AUG 04)

Risk Factors	Risk Level Circle the appropriate condition for each factor			
	0 **Low Risk**	**1** **Medium Risk**	**2** **High Risk**	**3** **Extreme Risk**
Risk Management Worksheet	All controls implemented			Not all controls implemented
WBGT at site NOTE: Add 5 F. for backpack or body armor	< Cat 1	Cat 1	Cat 2-3	Cat 4-5
Back-to-back Cat 5 days	0	1	2-3	>4
Heat Injuries in past 2 days	0	Heat Cramps	Heat Exhaustion	Heat Stroke/ Death
Workload in past 2 days (see TR 350-29 workload classification chart)	Easy	Easy or Moderate	Moderate or Hard	Hard
Projected workload	Easy	Easy or Moderate	Moderate or Hard	Hard
Heat acclimatization days	>13	7-13	3-6	<3
Leader/NCO presence	Full Time	Substantial	Minimal	None
Cadre duty experience	18 months	7-18 months	1-6 months	<1 month
Communication System (tested at training site)	Radio and phone	Phone only	Radio only	None
Previous 24 hours sleep	>7 hours	5-7 hours	2-4 hours	<2 hours
Food/salty snacks every 4 hours	<4 hours	4-6 hours	6-7 hours	>7 hours
Onsite 91W/CLS and iced sheets (8 single bed sheets/company in large ice water cooler)	Both	Iced sheets	91W/CLS	None
Add Circled Blocks:				

Total Score: 0-7 = Low Risk; 7-15 = Medium Risk; 16-24 = High Risk; 25-39 = Extreme Risk

>11 Total Score should have onsite 91W, Medic, and organic evacuation transportation.

Prevent: Minimizing Heat Load

- **SCHEDULE**:
  - Move training (workload) to cooler parts of day
  - Move training to cooler locations (shade, covered bleachers, etc.).
  - Avoid direct sun, if possible

- **CLOTHING/EQUIPMENT**: CDR /Leader/ NCO may authorize:

  NOTE: Add 5 degrees to WBGT for rucksack or body armor. Add 10 degrees to WBGT if in MOPP 4.

  - **Heat Cat 3**:
    - Unblouse BDU trousers; roll up to boot top
    - Unbuckle web belt
    - Remove Body Armor
  - **Heat Cat 4:**
    - Same as Heat Cat 3 plus
    - Unbutton BDU blouse sleeves, then cuff x2
    - Remove t-shirt from under BDU top, or remove BDU top down to t-shirt (remove t-shirt and wear BDU top if there is direct sun exposure or the presence of biting insects)
    - Replace helmet with soft cap unless needed for safety
    - Decrease backpack load to <30 lbs
  - **Heat Cat 5**:
    - Same as Heat Cat 4 plus
    - Remove backpack

Prevent: Minimizing Heat Load (Continued)

- **EVENTS:**
  - **Avoid strenuous, back-to-back events**
  - **Double spacing in formations (60")**
  - **Shade Soldiers whenever possible**
  - **Overhead shelters in training areas**
  - **Cool showers at the end of the day**
  - **Modify events in Cat 4-5 weather:**
    - **Increase breaks; Synchronize rest breaks for timed events**
    - **Shorten distance/adjust pace**
    - **Adjust uniform**
    - **Decrease load (remove backpacks, equipment, decrease weight, etc.)**
    - **Train during cool (night) temperatures**

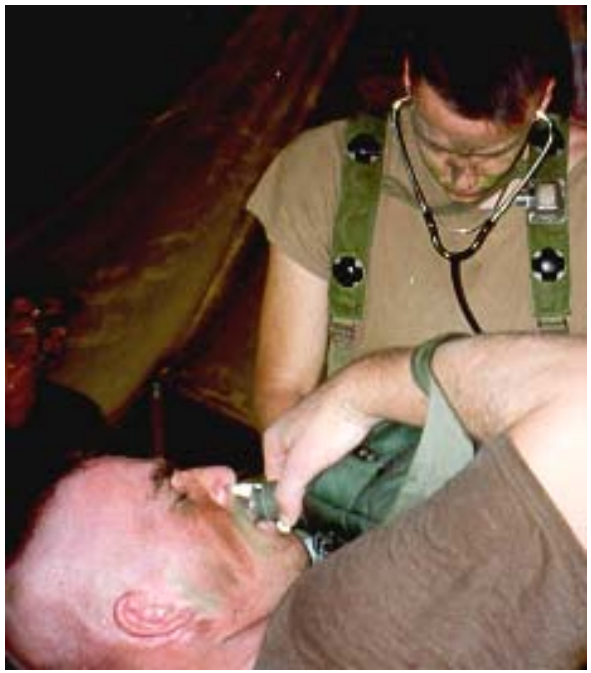
What Increases the Risk for Heat Injuries

- Not using previous 3 days of heat and workload in RM planning
- Not stopping and reassessing risk when Heat Injuries occur
- Pushing Soldiers who are showing symptoms
- Not adjusting workload, breaks, uniform, and equipment to Heat Category; Requiring adjustment approval away from work site
- Food deprivation
- Not hydrating before early am runs and throughout training day
- Ineffective Attitudes/Myths:
  - "That which doesn't kill you makes you stronger."
  - "Breaking them during training prevents them from breaking in war."
  - "Working harder in heat prepares them for austere desert conditions."
  - Reality: Training IAW heat prevention doctrine prepares Soldiers for OIF and saves lives. Do it right so Soldiers learn it right.

What Decreases Heat Injury Risk

- Moving work to cooler times/places (always hydrate BEFORE early am runs).
- Adjust work-rest cycles (TB MED 507; TR 350-29).
- Frequent, cool water (but no more than 1.5 qts/hr or 12 qts/day).
- Food (vegetables, fruits, salty snacks, electrolyte/carb/protein beverages, electrolyte/carb/protein gels) (every 4 hrs. or less).
- Sufficient electrolytes (salty snacks, salty soups, electrolyte beverages, electrolyte gels).
- Cooling (showers, fans).
- Adjusting clothing/equipment. Allow senior Leader/NCO on the ground to make the call.
- Wearing sunburn lotion (SPF 50, sweatproof, with vitamins).

Recognizing & Treating Heat Injuries



RECOGNIZE HEAT INJURIES

- Muscle cramps
- Dizziness
- Headache
- Clumsiness, unsteadiness, staggering gait
- Irritability
- Vomiting
- Confusion, mumbling (Does not know Who, When, Where)
- Combative
- Passing out

TREAT

- STOP, REST, COOL, CALL
- **Immediate** cooling with 100% observation is critical for Heat Stroke.
  - *Iced sheets are best method for cooling*
- When in doubt, evacuate any Soldier needing rapid cooling.
- Always remember that confusion is a BAD SIGN, not a sign of weakness.
- One Soldier stays with casualty to spot symptom changes.

Mild Heat Cramps; Mild Heat Exhaustion) -- Treat

IF Soldier has symptoms:

- Muscle cramps
- Dizziness
- Headache
- Clumsiness, unsteadiness, staggering
- Irritability

THEN

- **STOP**. Stop activity.
- **REST**. Rest Soldier flat with feet elevated on their helmet, sand bags, etc.
- **COOL**.
  - Move Soldier to cool location (shade, A/C car/bldg., etc.).
  - Loosen uniform/ remove BDU blouse/ remove head gear.
  - Have 91W Medic or CLS evaluate Soldier.
    - **History of excessive water intake, large clear urination, poor food intake, vomiting, and/or distended abdomen? Give salty snack if conscious. Do not give water or IV.**
    - **If opposite symptoms are present, then have casualty sip 2 qts. cool electrolyte beverage as tolerated over twenty-thirty minutes. Do not force water.**
  - Evacuate if no improvement in 30 min, or if Soldier's condition worsens.
  - **NOTE: It is important that the same person observes Soldier during treatment and evacuation in order to spot symptom changes**

- **Reassess situation and check other Soldiers**
- **The goal is to prevent Heat exhaustion from becoming Heat Stroke**

Heat Stroke -- Treat

IF Soldier is:

- Confused, mumbling (doesn't know who, when, where; i.e. abnormal mental status)
- Combative
- Passed out
- Vomits

THEN

- **STOP**. Stop activity.
- **REST**. Put Soldier flat on a poncho with feet elevated on their helmet, sand bags, etc.
- **COOL**.
  - Move to cool location (shade, etc.)
  - Strip BDU and boots off to underwear (t-shirt/briefs).

    NOTE: Saving a life is more important than modesty, but ensure a same gender helper is present
  - **Immediately** cool Soldier with iced sheets (best). Cover top of head and all exposed skin with iced sheets.
  - Soak with water if iced sheets are not available.
  - Fan the entire body.
  - Stop cooling if shivering occurs.
  - CLS/91W evaluate casualty:
    - History of excessive water intake, large clear urination, poor food intake, vomiting, and/or distended abdomen? Give salty snack if conscious. Do **not** give water or IV.
    - If opposite symptoms from above, then have casualty sip cool electrolyte beverage as tolerated (if awake). Do **not** force water. If evac delayed >10 min, give 500 cc Lactated Ringers or Normal Saline IV.
- **CALL**. Call for evacuation. Continue cooling enroute.

- **Reassess situation. Evaluate other Soldiers**. Treat any other Soldier with abnormal mental status as a heat stroke victim.

Treat: Immediate, rapid cooling

Cooling is first priority- can reduce death rate from 50% to 5%

- Put in shock position (feet elevated) on a poncho.
- Strip BDU off to underwear (t-shirt/briefs).
- Apply iced sheets. Cover top of head and as much exposed skin as possible with iced sheets.
- Soak with water.
- Fan.
- Massage large muscles while cooling.
- When sheets warm up, apply fresh, cold sheets or put them back into cooler and then reapply.
- 100% observation by the same Soldier.
- Stop cooling if shivering occurs or when rectal temp drops to 100 F. (91W task)
- CLS/91W evaluate casualty before giving water or IV.
- Evacuate. Continue cooling enroute.

Iced Sheet Treatment

Stop cooling when casualty starts shivering or rectal temp is 100 F. (91W task)

Basic load: 8 sheets/company in large cooler of ice water.

IDENTIFY HAZARDS / ASSESSS HAZARDS / DEVELOP CONTROLS / IMPLEMENT CONTROLS / SUPERVISE-EVALUATE

Heat Injury Evacuation criteria

- Loss of consciousness or other mental status changes
- Vomits more than once
- No improvement after 30 min. of rest and hydration
- General deterioration/worsening during treatment
- Rectal temp >104 (91W task)

- Evacuate any soldier to the hospital that requires cooling with iced sheets due to abnormal mental status

Water Intoxication (Hyponatremia)

- Frequently occurs in basic training units
- Mental status changes
- Vomiting
- History of consumption of large volume of water
- Poor food intake
- Abdomen distended/bloated
- Large amounts of clear urine

- Do not give more water or IV! If awake, allow Soldier to consume salty foods/snacks

Medical Support Issues?

- Some installations only have clinics instead of hospitals. Some have no organic Emergency Room.
- Some units have no ground ambulance support.
- What are alternatives?
  - Enrich CLS training and decision guidance to include iced sheet treatment.
  - Carry iced sheets. Plan on 8 sheets per company in large ice water cooler.
  - Coordinate for non-military ambulance support (garrison or off-post).
    - What support can they provide?
    - What is their level of training?
    - Do they have gate access?
  - Coordinate unit transport (as necessary).
  - Rehearse to ensure 100% communication (Cell phone dead zones, radio interfaces).

Heat Injury Prevention posters and cards at:
http://chppm-www.apgea.army.mil/heat/

Questions? Concerns? Comments?